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Veterinary Services[16]

Syria is fortunate in being free of the major animal plagues, but such controllable conditions as helminthiasis and the pox diseases are allowed to take a heavy annual toll of sheep and goats, while Newcastle disease in poultry rages almost unchecked over the greater part of the country, in spite of the fact that the laboratory in Damascus can produce an almost unlimited supply of a completely efficacious freeze-dried vaccine at an exceedingly low cost.

It is true that until relatively recently difficulty was experienced in producing locally a satisfactory vaccine for the control of sheep-pox but these difficulties have now been overcome by the loan of FAO personnel; production capacity for sheep-pox vaccine is now sufficient for the annual vaccination of the entire sheep population.

A rising incidence of brucellosis and tuberculosis in cattle, particularly in the urban and suburban dairying herds, may give rise to serious losses unless checked in an early stage. The services of the expert in field diagnosis provided by FAO should be especially valuable in this connection.

The Veterinary Department of the Ministry of Agriculture employs some 16 veterinarians, of whom five have been trained in Europe, four in Turkey, and seven in Egypt. Of the 16, two are at Headquarters in Damascus, four at the school for veterinary assistants, one at the laboratory in Damascus, and nine at field stations. There are said to be about 10 training as veterinarians in Europe, America and Egypt. Experience elsewhere suggests that a fully-qualified professional staff of the present size, strengthened gradually by the accession of young graduates returning from overseas training, ought to provide disease control services adequate for Syria's needs during the next few years, particularly if full use is made of the veterinary assistants trained in the technical school at Damascus.

If the mission's proposals for a program of livestock improvement are adopted, animal diseases will assume a greater importance, since the improved stock is likely to be less tolerant than the low-producing Balady types. More emphasis will then have to be placed on disease control services, and the cadre of veterinarians in government employ will need to be enlarged.

At the present stage, indeed at any stage, quality is undoubtedly much more important than numbers. Professional qualifications of the present

[16] See Annex C, p. 315.

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staff vary a great deal in standard, and an effort should be made to ensure that staff for replacement and further recruitment is trained to the highest professional standards overseas. The Department should review the position, scrutinize the academic careers of students now abroad, and offer scholarships for short periods, say one year, of postgraduate training in some particular field of activity that will be useful to the government on the candidate's return. This postgraduate training should be entirely practical and the scholar should not be allowed to utilize it mainly for the purpose of obtaining a further degree. Experience in the field, either in government service or in private practice, in some country of similar climatic and stock-raising conditions, but with a much more advanced livestock industry and a highly developed state veterinary service, would be the ideal type of training for such men. FAO would no doubt be able to arrange to place these men in countries suited to the purpose and might even be prepared to offer fellowships, upon condition that the recipient will return to government employment in Syria. The laboratory staff needs relatively little reinforcement at the professional level for the moment. The posting of one additional veterinarian with some overseas laboratory experience would be sufficient; it would be useful if this were done while the FAO experts are at the laboratory to pass on their practical experience.

The technical school for veterinary assistants in Damascus has been giving a two-year course of training in Arabic; it is likely that the course will be lengthened to three years. The school should turn out highly trained assistants whose employment in the Department should enable each government veterinarian considerably to extend his coverage in terms of both numbers of animals and territorial area.

Communications are generally poor and the inadequacy of transport has apparently been one of the greatest handicaps of the field service. It is essential that jeeps or pick-ups should be available in sufficient numbers to enable the veterinarian and his assistants to get round the district, to respond promptly to reports of outbreaks of disease and requests for assistance, and to perform systematic mass-vaccinations where appropriate. Government-owned transport is often unduly costly and inefficiently maintained; if this is true in Syria, consideration might be given to the hiring of transport on a contract basis or to payment of mileage to an officer providing his own transport.

The entire budget allocation for veterinary services in 1954 was £S 188,000, or approximately £S 11,750 for each veterinarian in the

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Department, to cover all charges incidental to his activities, including the salaries of assistants and laborers, the provision of drugs, instruments and laboratory supplies, feed of animals, preparation of vaccines and sera. It is obvious that in relation to the environment the salaries paid to veterinarians are insufficient to attract and hold properly qualified intelligent men, and that the sum available to meet other expenses must be so inadequate that the professional man's abilities cannot be utilized to anything like their full extent. As a consequence in many cases there is a tendency to supplement the government income from commercial sources and eventually to regard the government post as part-time employment.

The mission recommends that an additional £S 1.2 million be made available up to the end of 1960 to defray the cost of a veterinary service, improved and expanded on the lines that are broadly indicated here and in Annex C. It is strongly recommended that a small committee, to which the FAO veterinarians should be coopted, be appointed to consider methods of improving the service, with particular attention to salaries, better communications and transport, assistance adequate to permit of the carrying out of mass-vaccination campaigns against Newcastle disease of poultry, sheep-pox, and the control of helminths, etc., along the lines indicated in Annex C. Alternatively, the government might prefer to seek the services of an experienced veterinary administrator to inquire into these matters and make recommendations. Such an inquiry need not take more than perhaps three months. Staff meetings should be arranged and it would be a great advantage to hold at least one joint staff meeting with the services in Lebanon and Jordan. The measures should raise the morale of the service which at present is regrettably low.

Breeding

The development of higher yielding types of livestock through selection and cross-breeding would be a great boon, assuming that it could be accomplished without sacrificing the hardiness under unfavorable conditions which much of the livestock in Syria has acquired, or that a parallel improvement were made in the environment of the animals. There are certain promising indigenous types which could be used as the starting point of a program to improve breeds. Among these are the Damascus dairy cow, the Julani beef cattle and the Damascus milk goat. Most of the sheep and goats are multi-purpose animals, raised for meat, milk,

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wool or hair. Existing poultry breeds are largely nondescript and are characterized by very low productivity.

To carry out experiments in breeding and animal husbandry, the government should push on with its program to establish a central livestock station near Damascus.[17] Within a few years two sub-stations might also be opened at Palmyra and Deir ez Zor, or at Hama, Selemiye or Raqqa. There is unfortunately a shortage of Syrians trained in such work, and at the outset it would probably be necessary to employ a foreign farm manager. A minimum of £S 1.2 million will be needed over the next five or six years to meet the necessary costs.

For sheep, the aim should be to develop a more productive animal, and to test the feasibility of breeding more specialized types by successive top-crossing of selected indigenous animals with such imported breeds as Merinos and Merino-Fleisch. For cattle, the task would be to improve the existing Julani and Damascus types by progressive selection and perhaps by a certain amount of crossing with such imported pure breeds as Brown Swiss. In the case of poultry, which is so important to the small farmer, there might be a gradual introduction of exotic blood by the issue to farmers of cockerels of the chosen exotic breeds, raised in the government breeding farm. In this breeding program great care will have to be taken to maintain adequate records on the production and hardiness of successive generations. It will also have to be accompanied by good animal husbandry to bring out the full potentialities of each genetic strain.

VI CREDIT, COOPERATIVES, EDUCATION AND MARKETING

Agricultural Credit

An adequate volume of credit on reasonable terms is in many respects the key to an improvement in agriculture and animal husbandry. Farmers must have the means to buy better tools, livestock and seed and to introduce new crops. If settled on new land they must be provided with housing and the capital necessary to start production. Both peasant proprietors and tenant farmers must be helped to emancipate themselves gradually from excessive reliance on non-institutional lenders such as landlords and

[17] See Annex C, p. 312.

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VII PASTURE RESEEDING

In the Main Report we specifically recommended the reseeding of the Resafe and Palmyra desert basins where the soil is fertile, the rainfall generally higher than in other desert regions, and the possibilities of storing some of the water and distributing it evenly by means of diversion dams better than elsewhere. In parts of Australia, Morocco, Algeria and South Africa, where climatic conditions are similar to those in the Syrian desert, introduction of the following herbs and grasses has shown good results: salt bushes (*Atriplex semibaccata; Atriplex vesicatum*); blue bushes (*Kochia sp.*); crow foot (*Erodium sp.*); buffalo grass (*Cenchrus ciliaris*); veldt grass (*Ehrharta calycina*); *Lotus marocanus;* and *Dactylis glomerata*, var. *Hispanica*. These perennials, more or less winter-hardy and drought-resistant, plus the existing flora, would probably make excellent sheep and goat pasture in Syria. The group of FAO experts which has been conducting experiments with respect to improved grazing conditions might help the Ministry of Agriculture to develop a successful program.

Since conditions in Iraq and Jordan are similar it would be advantageous if these countries were to participate in the program.

VIII LIVESTOCK

Livestock Center

We understand that a site for a center near Damascus has already been selected. We urge that stables and shelter, which would be designed to serve as models, should not be so elaborate as to be beyond the reach of the average farmer. We suggest that the main center have three separate divisions for sheep and goats, cattle, and poultry respectively, and that the two principal tasks of the staff should be to initiate a breeding program and to train Syrians in this work.

In the Sheep and Goat Division the sheep breeding program might be conducted along the following lines:

1st year: Assembling a station flock of the best indigenous type; purchase of 200-300 native ewes; and importation of a nucleus of pure-bred flocks—Merino from South Africa, Merino-Fleisch from Germany or

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Turkey, and, if possible, Karakul. For a start there should be three rams, plus at least 12-15 in-lamb ewes of each breed (preferably from the same breeder). The indigenous ewes would be inseminated with semen from the imported stud rams.

The flock of indigenous ewes is to be sent on migration under usual conditions. Careful periodic observations must be made for the purpose of recording such data as birth weights and growth rate of lambs; quality and quantity of wool produced by this and successive crosses; mortality among lambs; resistance to parasites; tolerance of environment as represented mainly by nutritional plane and climate; and general adaptability.

2nd year: The F_1 generation will grow to 12 months. All data concerning this generation must be recorded.

Two of the assistant staff might be sent on post-graduate fellowships abroad, and two recent graduates be added to the staff.

3rd year: Insemination of females of the F_1 generation with semen from stud rams. Observation and recording of the characteristics of the F_1 generation, further recruited by lambing.

4th year: Observations on maturation of the F_2 generation. Recording F_1 and F_2. Establishment of a stud book. Establishment of the sub-stations recommended in the Main Report. Formation of flocks for similar purposes in Palmyra and Deir ez Zor, largely by transfer of surplus animals from the Damascus station.

5th year: Insemination of F_2 and F_1. At the end of this year there should be sufficient indication as to the suitability of the chosen breeds, and it should be possible to extend cross-breeding facilities to selected local flocks through the agency of insemination stations.

6th year: During this year, the F_2 generation will come to maturity. Sufficient data will be available to permit a final comparison of the suitability of the different breeds to Syrian conditions. It should then be possible to decide whether to continue topcrossing to produce virtually pure-bred stock, or whether the objective should be an intermediate type of perhaps three-quarters imported blood.

During the five-year program, the main station should also establish a good flock of the Damascus type of milk goat, and fully record all data. The aim should be to fix desirable characteristics for breed. In general, experimentation and research should be on lines similar to those applied to sheep.

In the Cattle Division the program would be:

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232 *1st year:* Assembling two herds, one of Damascus and one of Julani, by purchase of selected cows, giving preference in the case of the Damascus breed to cattle families known to the breeders as throwing a high proportion of good-yielding cows. Experience suggests that it is from animals of this type, rather than from the occasional freak with an exceptionally high yield, that improvement of indigenous types is most readily effected. The selected herd of Damascus cows should be fed for milk production, and the herd of Julani cattle for meat and draft purposes. Full herd-book and production records should be kept, and the data derived should form the basis for the establishment of Damascus and Julani herd-books within a few years.

Importation of a herd (three bulls and 12 in-calf heifers) of foreign breed; Brown Swiss might best serve the triple purpose of milk, meat and draft. The aim must be to maintain four herds at the main center—a pure-bred Damascus herd, a pure-bred Julani herd, a pure-bred Brown Swiss herd and a grade herd.

From the start fodder should be grown on an adequate scale and fodder production should be regarded as of major importance. Every advantage should be taken of silage and of new or improved crops. Great emphasis should be laid on the provision and preservation of feed during the winter. Concentrates that may become available from local industrial enterprises, e.g., dried sugar beet pulp, oil cakes, etc., should be utilized and their nutrient value evaluated.

2nd year: Recording of milk production. Recording F_1 generation: weight; growth; hemoglobin; blood minerals; adaptibility to environment. Continuation of trials of feeding methods.

3rd year: Continuation of herd records and experiments with fodder plants and feeding. Establishment of a stud-book. Establishment of Breed Association for Damascus cattle. By this year it would be possible to start experimental artificial insemination of local farmers' cattle with selected or imported bulls. More attention should be paid at such schools as the Kharabo Agricultural School and the Damascus Veterinary School to instruction in artificial breeding techniques.

4th and 5th years: Continuation of the development of the selected indigenous and imported herds. There will now be an F_2 generation of the grade herds and all three herds should be well established.

The program should be continued until sufficient data on production, adaptability and feed requirements have been collected to make possible

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a reliable comparative evaluation of the different herds under Syrian conditions.

The Poultry Division should import high-producing breeds, e.g., Rhode Island, New Hampshire, Leghorn and Plymouth Rock. Accepted modern practices of elimination, selection and feeding should be followed and quality should be maintained by regular culling and full recording. Failure to maintain the original quality by the two latter methods is the principal defect in many flocks maintained by institutes in countries of the Middle East and Far East, and is usually associated with heavy wastage from preventable disease.

The aim should be to establish a hardy type of dual-purpose bird—for eggs and meat—of special value to the small farmer. Experimental work should be done on control of parasites and construction of cheap but hygienic poultry houses of locally available materials. The land and feed requirements of the poultry unit should receive every consideration when the fodder crops program is being planned, and full use should be made of such by-products as oil cake.

During the second year selected cockerels of high-producing breeds could be distributed to the villagers to improve local strains. These should first be immunized against Newcastle disease and a service should be organized to encourage mass immunization throughout the country.

A few graduates of Kharabo and the Damascus Veterinary School might be encouraged to specialize in poultry improvement and at least two fellowships might be awarded for practical work overseas. Once the main flocks are well established at the central station, similar projects might be developed at additional sub-stations distributed throughout the country. These centers should specialize in establishing the best type for the various regions.

We estimate necessary capital outlay for this program at £S 380,000 and ultimate annual operating cost at about £S 240,000.

Veterinary Service

The headquarters of the Government Veterinary Service is in Damascus where, as the Department of Animal Resources, it forms part of the Ministry of Agriculture. There is a government veterinary laboratory in Damascus, mainly occupied with diagnosis of disease and preparation of biological products, i.e., vaccines and sera. A certain amount of modern

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232 equipment, including centrifugal freeze-drying plant, has been provided in recent years by FAO, which has also assigned specialist personnel to undertake diagnosis to prepare vaccines and sera and to instruct Syrian personnel in this work.

At present the Syrian staff of the laboratory consists of one fully qualified veterinarian (trained in France and Germany) as Director, and four Syrian veterinary assistants trained in the Damascus Veterinary Technical School. One of the assistants has recently been awarded a fellowship (FAO) for training in dairying and is at present in Denmark. Another will be taking up a year's fellowship in July 1955 to study the practical production of veterinary biologics in Denmark and Sweden.

The laboratory is basically well enough equipped to prepare any type of vaccine, and in particular prepares such modern living virus vaccines as those of Newcastle disease, fowl pox and sheep pox. Vaccines of this type are freeze-dried to improve their keeping qualities and to enable them to be standardized by tests and titrations.

In addition to supplying Syria with all the vaccines it requires, the laboratory during the last twelve months has supplied large quantities of anthrax, black quarter, fowl pox, sheep pox, goat pox and Newcastle vaccines to Lebanon and Jordan. In fact the consumption by Jordan and Lebanon of Newcastle vaccine in particular has been considerably greater during this period than that of Syria. This emphasizes the recommendation in the Main Report that transport and all the necessary facilities for performing mass immunizations should at once be made available to the veterinary service.

It is essential to any plans for the improvement of livestock that efficient veterinary services should be available both to the Bedouin stockowners and to the settled farming community, and that the confidence of the stockowners in such services should be built up to the point where they will rely on skilled assistance from the service to help them to meet the day-to-day problems of caring for animals of improved types.

An inventory of modern equipment suitable for district veterinary stations should be prepared and orders should be placed as soon as possible.

It is recommended that meetings of the professional staff be held regularly and that the first of these meetings give consideration to a mass immunization campaign against Newcastle disease. Such a campaign would save the lives of hundreds of thousands of birds during the first year and

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would enable poultry to make a substantial contribution to family incomes in the villages.

Very recently the Bedouin shepherds have apparently acquired confidence in the sheep pox vaccine, and the mission was informed that demands for vaccination in 1954 far outstripped the capacity of the field services. Sheep pox is a disease which annually causes considerable losses, but for which an efficient vaccine is available. It would seem incumbent on the government to insure that the service has the facilities for applying vaccination to the flocks.

It is recommended that with the assistance of the district veterinary staff the laboratory carry on seasonal surveys of blood mineral levels of sheep and cattle, and helminth burdens. Young veterinary assistants or science graduates should be trained to collect the blood samples in the one case and the parasitic worms in the other. The blood mineral determination and the determination of parasitic worms would be made at the laboratory. Therapeutic and control measures based upon these findings should be applied by the district veterinary staff in consultation with the laboratory. Some strengthening of laboratory staff at the veterinary assistant level will be required if systematic studies of this nature are to be undertaken.

The increasing incidence of brucellosis and tuberculosis in dairy cattle in the suburban areas to which reference has been made in the Main Report calls for investigation by biological tests and the application of control measures. The introduction or development of more productive types of livestock inevitably brings more problems for the veterinary service; unless the service can cope with these problems and meet increased demands for assistance the improved types of stock will not survive.

Artificial breeding methods, which are likely to be employed on an increasing scale as livestock farming methods advance, should be completely controlled by the service. The method can be as efficient in spreading certain diseases as it is in distributing the sperm of superior sires; the fullest possible measure of veterinary control must be exercised to guard against this danger.

The control of abattoirs and meat inspection is performed by veterinarians and veterinary assistants in the employ of the municipal authorities of such cities as Damascus and Aleppo. The municipal abattoir of Damascus is about 130 years old and is now almost enclosed by the town. It is

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desirable that a modern abattoir be built in a more suitable location; the present problem of drainage disposal would alone warrant this measure. There should be no difficulty about the provision of capital for such a project, since the municipal authority can recoup its expenditures by the collection of fees.

222. The present budget of £S 188,000[8] for personnel and equipment bears no relation to the value of Syrian livestock or to preventable losses. For more effective disease control the mission has recommended that an additional £S 1.2 million be made available during the next six years.

IX EDUCATION, RESEARCH AND EXTENSION

Education

Elementary agricultural education. Since 1949 the rural elementary schools have devoted the two final years (fourth and fifth grades) to theoretical and practical instruction in agriculture and hygiene. At present 111 offering this type of instruction, each with a field of five *donums*[9] for practical field training, are distributed through *mohafazats* as follows:

Damascus	37	Dera'a	13
Aleppo	9	Soueida	11
Latakia	11	Deir ez Zor	9
Hama	5	Hassetche	5
Homs	11		

The pupils (9,000 in 1954) learn the basic principles and techniques of agriculture, practicing them in the school gardens.

Clearly this number of schools cannot provide basic rural education for all the children of Syria's 5,500 villages. Apart from the need to build more schools and enlarge existing ones, a way must be found to train additional agricultural teachers; the teacher training and secondary agricultural schools in Dera'a and Kharabo do not turn out sufficient numbers.

The mission therefore makes the following recommendations:

[8] £S 50,000 for laborers at the Damascus veterinary research center and in the provinces; £S 40,000 for purchase of animals and feed; £S 98,000 for technical requirements (£S 20,000 for the Damascus laboratory; £S 58,000 for the preparation of vaccines and biologics material; and £S 20,000 for medicines in respect of the treatment of parasitical diseases).

[9] A donum = 0.1 hectare.

the refuse dumps and other breeding sites are sprayed with DDT preparations at intervals between May and October.

LICE. Infestation with lice is common among the inhabitants in the congested quarters of the towns and in the villages and the Bedouin encampments. *Pediculus humanus corporis* is important as the vector of typhus fever; cases are reported almost annually. *P. humanus capitis* and *Phthirus pubis* are somewhat less frequent.

FLEAS. Numerous species of fleas parasitize the wild and the domestic rodents. The rat flea, *Xenopsylla cheopis*, is prevalent: it is the vector in sporadic cases of murine typhus, and in past decades it was implicated in the transmission of plague. The human flea, *Pulex irritans*, and the cat and the dog fleas, *Ctenocephalides felis* and *C. canis*, are widely distributed. The stick-tight flea, *Echidnophaga gallinacea*, sometimes attacks man, but it is of no known medical significance.

BEDBUGS. *Cimex lectularius* is an annoying pest in all parts of the country.

TICKS AND MITES. A variety of ticks, including *Rhipicephalus sanguineus* and several species of *Hyalomma*, infest the livestock. *Ornithodorus tholozani* is found in the rural areas, where it is the local vector of tick-borne relapsing fever.

The grain itch mite, *Pediculoides ventricosus*, is plentiful in the grain-producing regions. It frequently attacks man, causing a painful rash. The human itch mite, *Sarcoptes scabiei*, is widely distributed, but it is decreasing steadily in prevalence.

SCORPIONS AND SPIDERS. Several species of scorpions are present, including *Buthus quinquestriatus*, *B. judaicus*, *B. crassicauda* and *B. europeus*, and *Scorpio maurus propinquus* and *S. maurus fucus*. Serious systemic effects resulting from scorpion stings are rare, but deaths are sometimes recorded among young children, usually after attacks by *B. quinquestriatus*.

The poisonous black spider, *Latrodectus tredecimguttatus*, is found in some localities.

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highly infected villages were situated on the Gerabi and the Soublakh wadies. Similar surveys in 9 villages in the Tell Abiad area showed an average infection rate of 77 per cent, with the greatest prevalence in the villages on the Tell Abiad and the Slouq branches of the Belikh. Infection is apparently acquired early in life through swimming, washing or other contact with streams inhabited by infected snails. The intermediate host, *Bulinus truncatus*, has been collected from several localities.

Two mobile treatment teams were operated by the Ministry of Health in the infected areas in 1951. Plans for the inauguration of a snail eradication program were also under consideration.

OTHER HELMINTH INFECTIONS. Infection with one or more varieties of intestinal worms is prevalent in all parts of the country. The insanitary habits of the people and the frequent use of night soil as fertilizer promote the spread of the different species. Ascariasis is widely distributed. Infection rates ranging from 30 to 86 per cent have been demonstrated in Aleppo, Damascus, Homs and Hama, as well as in the surrounding villages. The infection is most prominent among the children, in both urban and rural areas. Trichuriasis is also widespread, but enterobiasis and strongyloidiasis tend to be sporadic.

Taeniasis is common. The beef tapeworm, *Taenia saginata*, is enzootic among the cattle, and the popularity of raw, or underdone, meat in certain national dishes is responsible for considerable human infection. The pork tapeworm, *T. solium*, is sometimes encountered among the Christian communities. Occasional infections with the dwarf tapeworm, *Hymenolepis nana*, are observed in most districts.

Hydatid disease is not unusual. *Echinococcus granulosus* is enzootic among dogs, sheep, goats, cattle and camels. In studies reported in 1936,[49] cysts were detected in 25 to 30 per cent of the sheep and the goats examined in slaughterhouses in Aleppo, Damascus and Homs. Infection was uni-

versal among the 15 camels slaughtered in the same period, but the consumption of camel's meat is normally restricted to small groups of the population. 232 164

Rare cases of trichinosis are reported among the Christian peoples. Canine infections with the fluke, *Heterophyes heterophyes*, are numerous, and one instance of infection in man has been recorded. 164

Brucellosis. Brucellosis is enzootic among the goats and the cattle. Sporadic cases of undulant fever, caused by *Brucella melitensis*, occur in man. However, infection with *Br. abortus* has not been reported. According to local custom, milk is seldom used without boiling, but infection may result from the consumption of contaminated cheese or butter, as well as from contact with infected animals. 232 164 262 252 164

Diseases Spread Chiefly Through the Respiratory Tract

Tuberculosis. The reporting of tuberculosis is not compulsory in Syria, and the prevalence of the disease is not accurately known. On the basis of mortality statistics for 1947 and 1949, about 1.8 to 2.0 per cent of the total recorded deaths were due to tuberculosis. The usual discrepancies in reporting are exaggerated, however, by the tendency to conceal the presence of tuberculosis because of the social stigma attached to the disease. From 80 to 90 per cent of the known deaths were attributed to pulmonary infection, but nonpulmonary forms of tuberculosis are common in most areas. Competent local authorities estimated that there were at least 32,000 cases of tuberculosis in the country in 1951, representing a morbidity rate of about 10 per 1,000 population. 164 165 164 183 164

In the survey carried on in Damascus in 1950, tuberculin tests were performed on 10,695 individuals between 6 and 24 years of age. The positive reaction rate rose progressively with age: 12 per cent of 563 children, 6 years of age, gave a positive reaction to tuberculin, and 46 to 51 per cent of 1,079 persons from 16 to 19 years of age. 659 751

of rabid dogs, but wolves, hyenas, jackals, rats and other animals are sometimes implicated. Prophylactic treatment is provided by the Ministry, and a special division for the preparation of antirabic vaccines is incorporated in the central laboratory in Damascus. From 140 to 250 persons were treated annually in the 4 years 1948-51.

Other Infections. Tetanus is endemic, and occasional cases are observed. Anthrax is enzootic among the sheep, and human infections sometimes occur in the agricultural areas. Sporadic cases of Weil's disease are reported.

Diseases Spread by Arthropods

Malaria. Malaria is a disease of major public health and economic importance, since it is endemic or hyperendemic in all populous sections of the country. The prevalence of the disease is directly related not only to the physical geography of the different regions, but to the degree and the type of cultivation. The most seriously affected foci are the plains around Damascus and Aleppo, the Orontes valley from Hama to the Turkish frontier, the irrigated zones bordering the Belikh and the Khabour rivers and their tributaries, and the swampy districts of Hauran province. Universally high infection rates are experienced during epidemic years, even in areas of low endemicity.

No large-scale surveys have been attempted, but accumulated studies provide rough estimates of the extent of infection in localized areas. Prior to the development of a program for the control of malaria by the Ministry of Health and the Near East Foundation in 1949-50, the spleen index among children under 10 years of age in the villages around Damascus ranged from 40 to 80 per cent, with the highest rates in villages on the periphery of the Outaybeh swamps in the eastern part of the oasis. In the vicinity of Homs, the spleen rates normally average 50 to 70 per cent.

In the course of joint surveys made by the malariologists of the United Nations

October, when the vector sandflies, *Phlebotomus papatasii* and *P. sergenti*, are abundant.

Kala-azar is seldom specifically reported from Syria, but occasional suspected cases have been described from the Jebel ed Druz region. A canine reservoir undoubtedly exists: the causative organisms have been demonstrated in a stray dog captured at el Bab, near Aleppo.[38]

Other Infections. Outbreaks of dengue fever are sporadic in the western provinces where the vector, *Aedes aegypti*, is indigenous. Sandfly fever, transmitted by *Phlebotomus papatasii*, is endemic and sometimes epidemic.

Nutritional Diseases

Undernutrition and subclinical avitaminosis are prevalent, particularly in the rural villages, where poverty and parasitic infections influence the nutritional standards of the people to a greater extent than in the urban areas. Serious nutritional conditions are most obvious among the children of the Bedouin tribes. Minor vitamin C deficiencies are widespread among the inhabitants of the grain-producing areas in the northeastern and the southern provinces. Occasional borderline cases of pellagra are encountered, but beriberi and ariboflavinosis are unusual. Cases of rickets are numerous, especially in the cities and the towns. Protein edema and overt vitamin A deficiencies are relatively rare.

Miscellaneous Conditions

Infectious hepatitis is endemic, and epidemics are sometimes reported. Q fever is enzootic among the sheep and the goats, but the extent of human infection is not known. In a series of complement fixation tests recently performed on blood serums taken from sheep and goats in different parts of the country, positive reactions were obtained in 13 to 63 per cent.[40]

Silicosis and benign pneumoconiosis are

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